## CBSE Sample Paper-01
## Class – XII Physics (Theory)

**Time allowed: 3 hours**                                                                **M. M: 70**

**General Instructions:**

a) All the questions are compulsory.
b) There are **26** questions in total.
c) Questions **1** to **5** are very short answer type questions and carry **one** mark each.
d) Questions **6** to **10** carry **two** marks each.
e) Questions **11** to **22** carry **three** marks each.
f) Question No. **23** carry **four** marks each.
g) Questions **24** to **26** carry **five** marks each.
h) There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions in five marks each. You have to attempt only one of the choices in such questions.
i) Use of calculators is **not** permitted. However, you may use log tables if necessary.
j) You may use the following values of physical constants wherever necessary:

$c = 3x10^8 m/s$

$h = 6.63x10^{-34} Js$

$e = 1.6x10^{-19} C$

$\mu_o = 4\pi x10^{-7} TmA^{-1}$

$\dfrac{1}{4\pi\varepsilon_0} = 9x10^9 Nm^2C^{-2}$

$m_e = 9.1x10^{-31} kg$

1. Explain why two field lines never cross each other at any point?
2. The earth's core is known to contain iron. Yet geologists do not regard this as a source of the earth's magnetism. Why?
3. What do mean by alternating current AC.
4. How the photocurrent Varies with intensity of light.
5. What is the minimum & maximum value of modulation index?
6. What do you mean by an ideal dipole and what is the nature of electric field symmetry of the dipole?
7. What is the magnetic moment of an electron orbiting in a circular orbit of radius r with a speed v?
8. Velocity of light in a liquid is $1.5\times10^8 m/s$ and in air it is $3\times10^8 m/s$. If a ray of light passes from liquid into the air, calculate the value of critical angle.
9. Name a device that converts the change in intensity of illumination into changes in electric current. Give three applications of this device.
10. Define Hertz antenna and Marconi antenna.
11. (a) What is meant by energy density of a parallel plate capacitor? Derive its expression also.
    (b) What is the area of the plates of a 2 Farad parallel plate air capacitor, given that the separation between the plates is 0.5 cm?
12. (a) For the given carbon resistor, let the first strip be yellow, second strip be red, third strip be orange and forth be gold. What is its resistance? (b) What are thermistors?

13. State Ampere's circuital law. Also find the expression for the magnetic field due to the infinite long straight wire carrying current by using this law.

14. (a) What do you mean by hypermetropia? What are its possible cause and how it is corrected?
    (b) A hypermetropic person whose near point is at 100 cm wants to read a book at 25 cm. Find the nature and power of the lens needed.

15. Light falls from glass (n = 1.5) to air. Find the angle of incidence from which the angle of deviation is $90^0$?

16. (a) Represent the AM process graphically.
    (b) Write its two advantages

17. Prove that a convex lens produces an n times magnified image when the object distances from the lens have magnitude $\left( f \pm \dfrac{f}{n} \right)$. Here f is the magnitude of the focal length of the lens. Hence find the two values of object distance for which a convex lens of power 2.5 D will produce an image that is four times as large as the object.

18. Calculate the de-Broglie wavelength of a beam of electrons, accelerated through a potential difference of 10 kV.

19. (a) The energy levels of a hypothetical hydrogen-like atom are shown below diagram. Find out the transition, from the ones shown in the diagram, which will result in the emission of a photon of wavelength 275 nm.



    (b) Which of these transitions corresponds to the emission of radiation of (i) maximum and (ii) minimum wavelength?

20. Draw plot of the variation of amplitude versus $\omega$ for an amplitude modulated wave. Define modulation index. State its importance for effective amplitude modulation.

21. Distinguish between nuclear fusion and fission

22. In a diode AM demodulation the output circuit consists of R = 1 $k\Omega$ and C= 10pF.a carrier signal of 100 kHz, is to be demodulated. Is the given set-up good for this purpose? If not suggest a value of C that would make the diode circuit good for demodulating this carrier signal.

23. Ram had gone out of station, on a vacation for one week. After coming back, he tried to start his car but failed. He realized that he needs to charge the battery of his car. He went to the workshop to hire a battery charger. Ram connected the black lead of the battery charger to the positive terminal of the car battery and the red lead to the negative terminal of the car battery. The car battery was not charged. Ram thought over it and decided to reverse the leads. Now he was successful in charging the car battery.
    (a) What according to you are the values displayed by Ram?
    (b) How should a battery charger be connected to a car battery?

24. (a) Derive the expression for the torque on an electric dipole placed in a uniform electric field.
    (b) A pendulum bob of mass 80 mg carrying a charge of $2 \times 10^{-8}$ C is at rest in a horizontal uniform electric field of $2 \times 10^4$ V/m. Find the tension in the thread of the pendulum and the angle it makes with the vertical.

25. (a) Write the laws of electromagnetic induction.

(b) An express train takes 16 hours to cover the distance of 960 km. The rails are separated by 130 cm and the vertical component of the earth's magnetic field is $4 \times 10^{-5}$ T. (i) Find the induced emf across the width of the train. (ii) If the leakage resistance between the rails is 100 ohm, find the retarding force on the train due to the magnetic field.

26. (i) Define the term drift velocity.

   (ii) On the basis of electron drift, derive an expression for resistivity of a conductor in terms of number density of free electrons and relaxation time. On what factors does resistivity of a conductor depend?

   (iii) Why alloys like constantan and manganin are used for making standard resistors?